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THE PROCEEDINGS

OF THE

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Series B.

TAXONOMY

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NOTES ON SIPHONAPTERA FROM SOUTHERN AFRICA

By Botha de Meillon, D.Sc., F.R.E.S.

(*The South African Institute for Medical Research, Johannesburg.*)

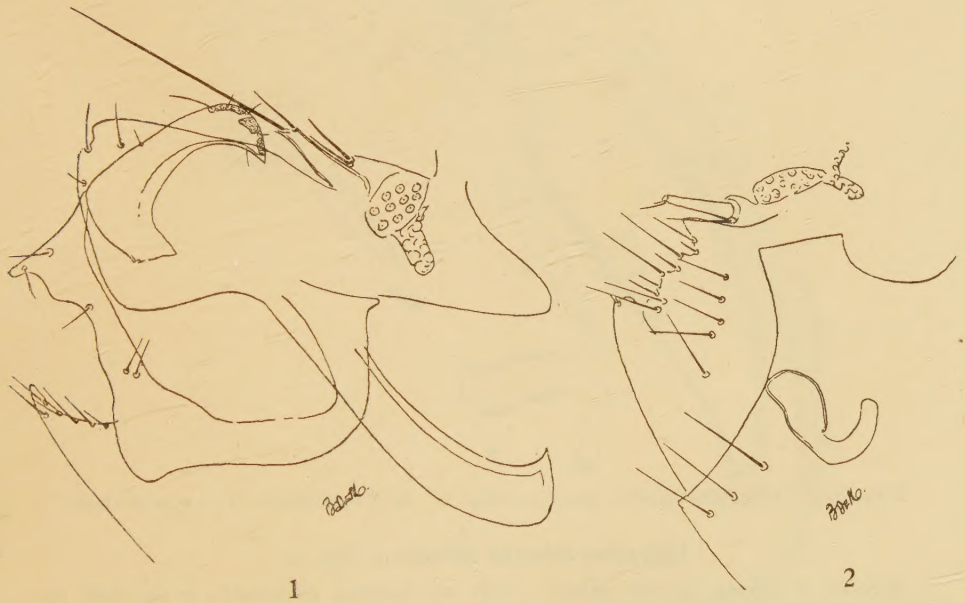
The type specimens of all the species described below are in the collection of the South African Institute for Medical Research, at Johannesburg.

I gratefully acknowledge the kindly help and advice of Dr. Karl Jordan, F.R.S., given in the course of preparing these notes.

Epirimia gen. n.

Related to *Cleopsylla* Fox, *Leptopsylla* J. & R., *Dinopsylla* J. & R. and *Chimaeropsylla* R. ♂♀. Eye placed at or above the base of the antenna; front margin of the head long, subangulate, reclining backwards; front of the head without an internal chitinous bar from the region of the eye to the vestigial frontal tubercle; head with an oblique row of teeth, the bases of which are parallel with the front; labial palpi with four segments; hind coxa with a patch of small spines on the inside near the apex; one antepygidial bristle accompanied by a minute hair on each side.

Genotype: *Ctenopsyllus aganippes* (Rothschild) 1904.



1 2

Figs. 1–2.—1, *Hypsophthalmus temporis* sp. n., ♂ terminalia; 2, ♀ terminalia.

I include as well in this genus *H. granti* (R. 1904). In spite of the fact that it differs in several respects from *aganippes* it is more nearly related to that species than to *campestris* J. & R. and the new species described below.

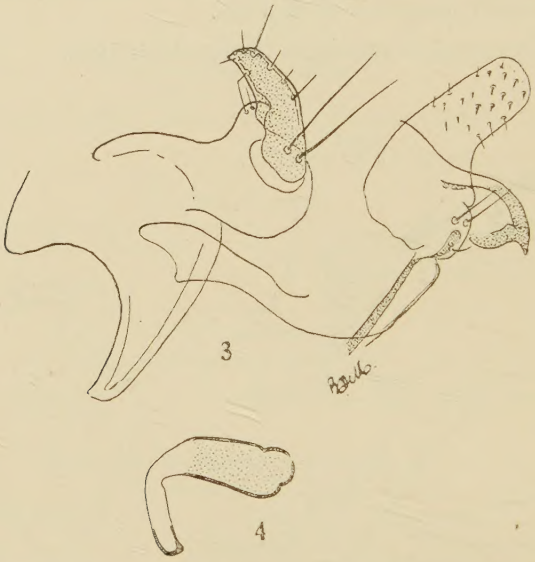
The genus *Hypsophthalmus* would then include *campestris* J. & R. and the new species described below. In this genus the front of the head is short and rounded and has an internal chitinous rod running from the region of the eye to the vestigial frontal tubercle; furthermore, the bases of the row of head spines do not lie in a straight line parallel with the front of the head.

Hypsophthalmus temporis sp. n.

♂. A species closely related to *campestris* J. & R. 1913 but easily separable by the male terminalia. *Head* short, rounded as in *campestris*, but with the third genal spine counted from below about as long as the second and therefore longer than in *campestris*; large bristle in front of the eye very long; rostrum shorter than the maxillary palp. *Thorax*, pronotum with a comb of twelve teeth; legs much as in *campestris*, but with less than twenty bristles on the outer surface of the hind tibia. *Abdomen*, bristles and spines as in *campestris*. *Terminalia* (fig. 1) differ principally from those of *campestris* as follows: manubrium of the clasper more upturned at the end; F of the clasper longer and bent near its apex; IXst truncated apically and expanded.

♀. Generally as in *campestris* but differing as follows: third genal spine from below as long as the second; stylet of nearly even width throughout; lobe of stVII square ended; spermatheca with the tail not narrowing towards the apex (fig. 2).

2 ♂♂, 1 ♀ off *Otomys* sp. O.F.S.: Groenpunt, Bethlehem (Zoological Survey). 2 ♂♂, 2 ♀♀ off *Rhabdomys pumilio*, Cape Province: Plettenberg Bay (*D. H. S. Davis*).



Figs. 3–4.—*Libyastus infestus selindae* subsp. n. 3, ♂ terminalia; 4, ♀ spermatheca.

Libyastus infestus selindae subsp. n.

Related to *infestus duratus* Jordan (1931) but differing principally in the male terminalia and female spermatheca. ♂ F longer and narrower; apex of the vertical arm of stIX with a longer upward projection; apical lobe of the ventral arm of stIX longer (fig. 3). ♀ tail of the spermatheca longer than the body (fig. 4).

2 ♂♂, 1 ♀ off *Paraxerus palliatus swinnertoni*, S. Rhodesia: Mt. Selindae, Melsetter. 1 ♂, 2 ♀♀ off a "squirrel," S. Rhodesia: Chirinda Forest, Melsetter.

Chiastopsylla couchae sp. n.

♂. The presence of a genal spine places this species near *godfreyi* Waterst. 1913, from which it is easily separable in having the manubrium shorter than the internal plate of the penis.

Otherwise it is more nearly related to *pitchfordi* Ing. 1927 and *mulleri* Ing. 1927, especially the former, which may show a rudimentary genal spine. It differs from *pitchfordi* and *mulleri* in several respects, namely clasper more rounded; bristles on stIX stouter; teeth of the pronotal comb longer, about twice the length of the teeth of *pitchfordi*. *Head*, two prominent genal spines present; rostrum reaches to the apex of the fore coxa. *Thorax*

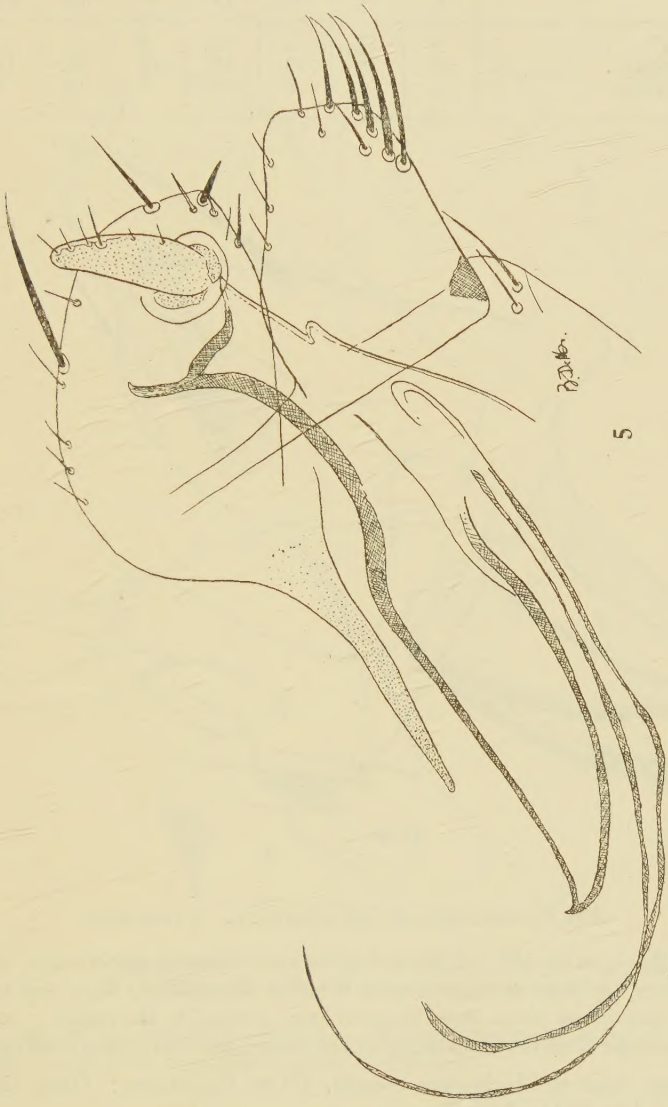


Fig. 5.—*Chiastopsylla couchae* sp. n. ♂ terminalia.

pronotal comb of about twelve teeth, the longest tooth measuring 56 μ; mesonotum with the admedian row of bristles not reaching down as far as the median row. *Legs*, mid leg with tI shorter than tII; none of the tarsal bristles extending beyond the apex of the succeeding segment; hind leg with tI slightly longer than tII, one apical bristle on tI reaches to the apex of tIII and one apical bristle on tII reaches to the apex of tV.

Abdomen, bristles and spines on the tergites, counting the two sides together, are as follows :—

	Segments.							
	I	II	III	IV	V	VI	VII	VIII
Spines	4	3	2	2	2	—	—	—
Setae : Tergite . . .	10	13	13	13	12	12	11	—
Sternite . .	—	2	6	5	4	4	4	5

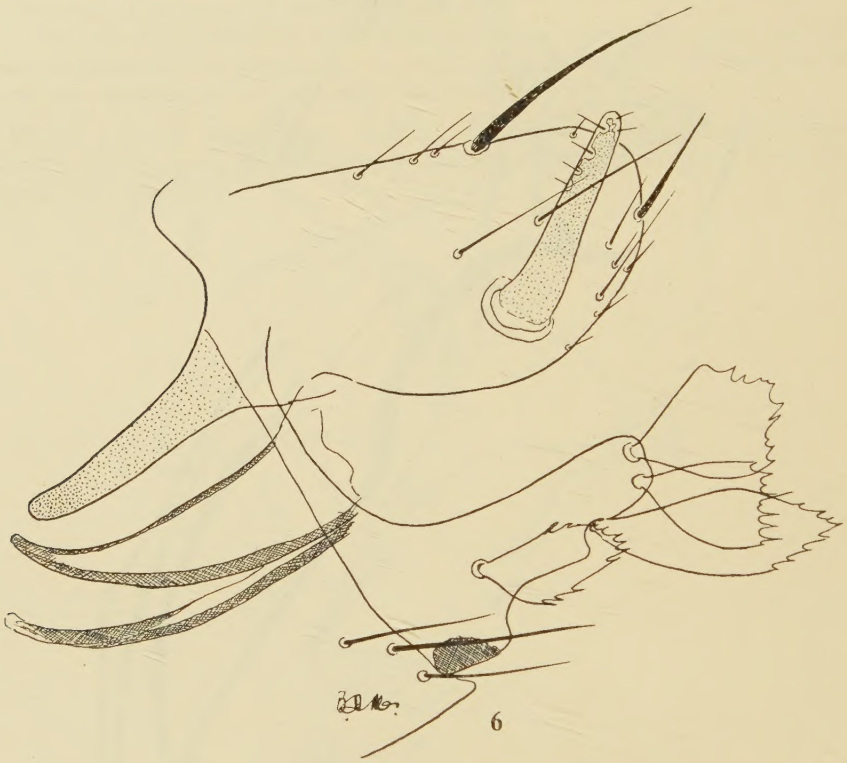


Fig. 6.—*Chiastopsylla caffrarica* sp. n. ♂ terminalia.

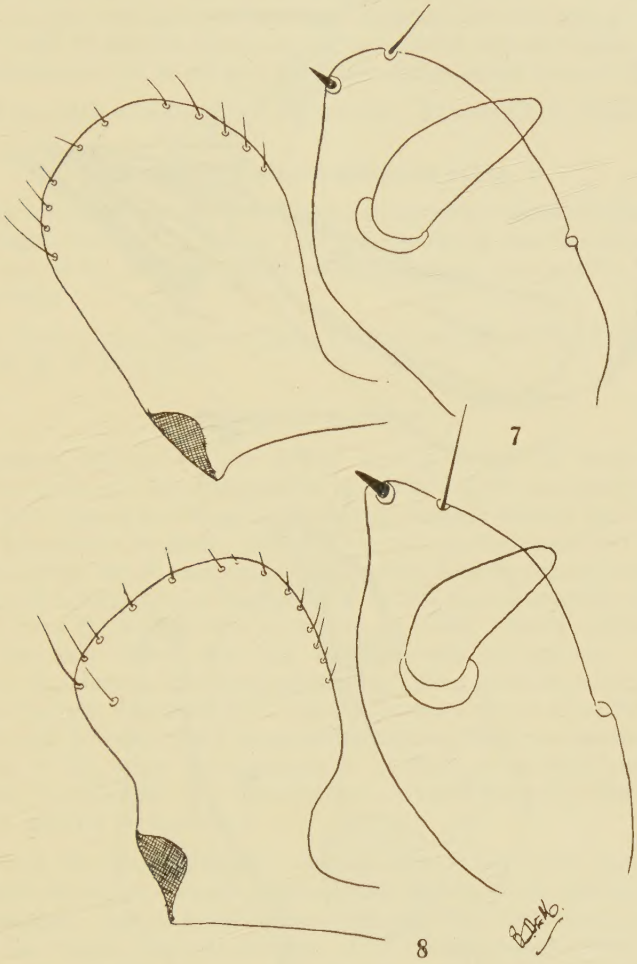
Terminalia (fig. 5), stIX with 4–5 heavy bristles at the ventral apical angle; clasper oval in shape, being less than twice as long as broad in the middle; finger less than half as long as the clasper and about three times as long as broad in the middle; internal plate of the penis longer than the manubrium of the clasper and coil longer than the plate.

1 ♂ from nest of *Mastomys coucha*, Cape Province : Glen Grey Falls, Lady Frere, 4.vi.39 (*L. Fourie*).

Chiastopsylla caffrarica sp. n.

♂. This species is related to *rossi* Waterst. 1909 and differs principally in the terminalia, the manubrium of the clasper being as long as the internal plate of the penis and the IXst with four pairs of scales on the distal margin. *Head*, a pair of well-developed genal spines present, rostrum shorter than the fore coxa. *Thorax*, pronotum with a comb of about

11 long teeth, the longest tooth measuring about 64 μ; mesonotum with the admedian row of bristles reaching down as far as the median row. *Legs*, mid leg with tI as long as tII, none of the apical tarsal bristles reaching beyond the apex of the succeeding segment; hind leg with tI slightly longer than tII and with none of the apical tarsal bristles reaching

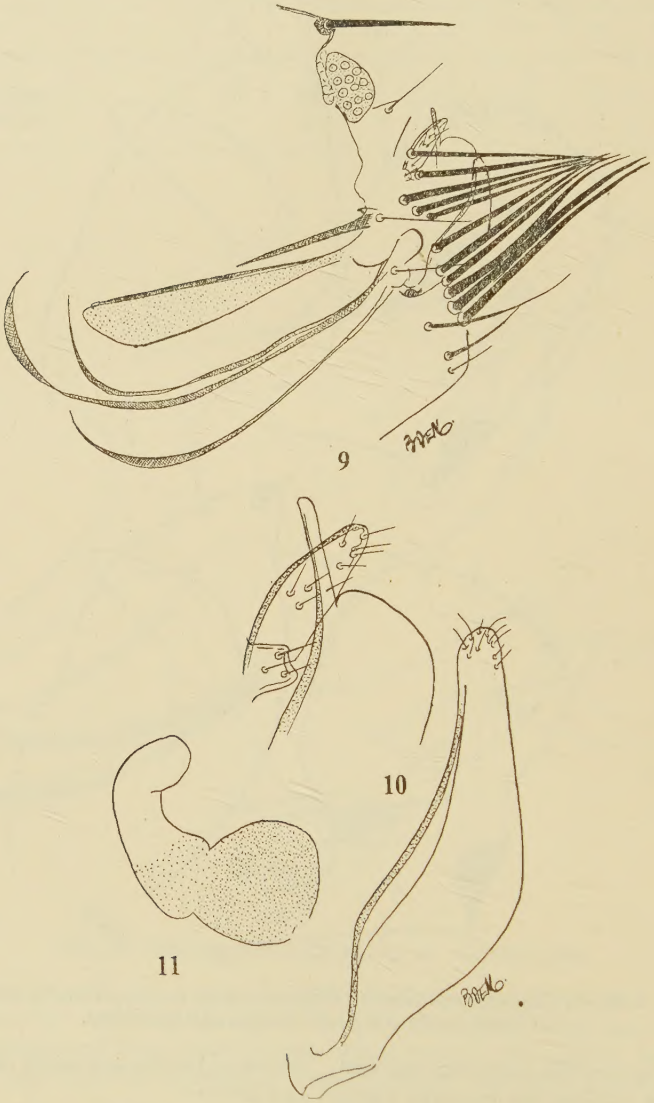


FIGS. 7–8.—7, *Chiastopsylla octavii caledonia* subsp. n. clasper and paramere; 8, *Chiastopsylla octavii* R. clasper and paramere.

beyond the apex of the succeeding segment. *Abdomen*, bristles and spines on the tergites and sternites counting the two sides together as follows :—

	Segments.							
	I	II	III	IV	V	VI	VII	VIII
Spines	4	3	3	3	2	—	—	—
Setae : Tergite . . .	9	15	14	14	13	13	11	—
Sternite . .	—	2	8	8	7	8	9	6

Terminalia (fig. 6), stIX shaped as in *rossi* Waterst. but with four pairs of scales, the apical two pairs being somewhat truncated, the extra scale occurs on the basal half of the vertical portion of the sternite; clasper rounded along its posterior border and less than twice as long as wide in the middle; finger long and narrow, being about half as long as



FIGS. 9–11.—*Xenopsylla davisi* sp. n. 9, ♂ terminalia; 10, stIX, paramere & Fi & Fii of ♂; 11, female spermatheca.

the clasper and about six times as long as wide in the middle; internal plate of the penis short, as long as the manubrium of the clasper; coil short, about as long as the internal plate.

1 ♂ off *Myotomus unisulcatus*, CAPE PROVINCE: Glen Grey Falls, Lady Frere, 5.vi.39 (*L. Fourie*).

Chiastopsylla numae klaveriana subsp. n.

Differs from the type as follows: ♂ clasper with five bristles placed on the lateral surface; sternites III–V with four bristles on each side; longest apical bristle on tarsal segment II hardly reaches to the base of tIV; stIX appears to be broader but may be due to the fact that the specimen has been somewhat flattened during the process of mounting. ♀ stII–VI with six bristles on each side, stVII with 8–9 bristles on each side; longest apical bristle of tII of the hind leg barely reaches to the base of tIV.

♂♀ off *Parotomys luteolus*, CAPE PROVINCE: Klaver (*C. V. Muller*).

Chiastopsylla octavii caledonia subsp. n.

♂ like *octavii* R. 1904 but apex of the clasper more rounded, the short spine and the long bristle standing at the same level (figs. 7 & 8); palp shorter than the proboscis; longest seta at the apex of the first hind tarsus reaches only to the apex of tII. ♀ palp shorter than the proboscis.

A series from a pigmy shrew, CAPE PROVINCE: Houw Hoek Pass, Caledon, 29.viii.39 (*D. H. S. Davis*).

Xenopsylla davisi sp. n.

This species belongs to the group having a row of stout bristles on stVIII in the male and the antepygidial bristle mounted on a small cone. Four species are now known to belong to this group, namely *sulcata* Ing. 1928, *hirsuta* Ing. 1928, *lobengulae* De Meill. 1930 and the new species described below. The males in this group are all easily separable but the females present some difficulty. In the original description of *lobengulae* I stated that the female differed from *hirsuta* in having more than twenty bristles on tVIII; the examination of more material, however, shows that the bristles vary in number. Some slight differences in the shape of the spermatheca have been noted in *sulcata*, *hirsuta* and the new species here described but I have not been able to separate the females of *lobengulae* and *hirsuta* by this or any other means. The new species differs from the females of the other three species in having no bristles laterally on the basal tergite, though with the examination of more material this may also be found to be subject to variation.

♂. *Head* with the dorsal incrassation shallower than in any of the other three species; proboscis about as long as the palps and not quite reaching to the apex of the fore coxa; eye well developed. *Legs* as in the other species, the hind tibia bearing only six dorsal notches and the longest bristle at the apex of tII reaching about to the middle of tV. *Abdomen* tI with a number of semi-upright bristles, much as in *hirsuta* and therefore not so prominent as in the other species; sternites with bristles as follows: II 2, III 4, IV 6, V 6, VI 6, VII 6, that is counting the two sides together. *Terminalia* (figs. 9 & 10), stVIII with about five bristles laterally, a closely set row of seven straight, long and strong, bristles along the apical margin and immediately above this row a group of 4–5 equally strong straight bristles, the bristles of this latter group are directed somewhat downwards and hence overlap the apical row; paramere with a very long narrow dorsal projection; stIX much swollen in the middle and so differing from the other species; P^1 small with a few hairs, P^2 long, about three times as long as wide in the middle with some slender hairs; internal plate of the penis only slightly widened apically and hence unlike that of the other three species, the shape of this plate enables one to recognise *davisi* sp. n. immediately; coil short, making only about half a turn; manubrium of the clasper short, sharply pointed.

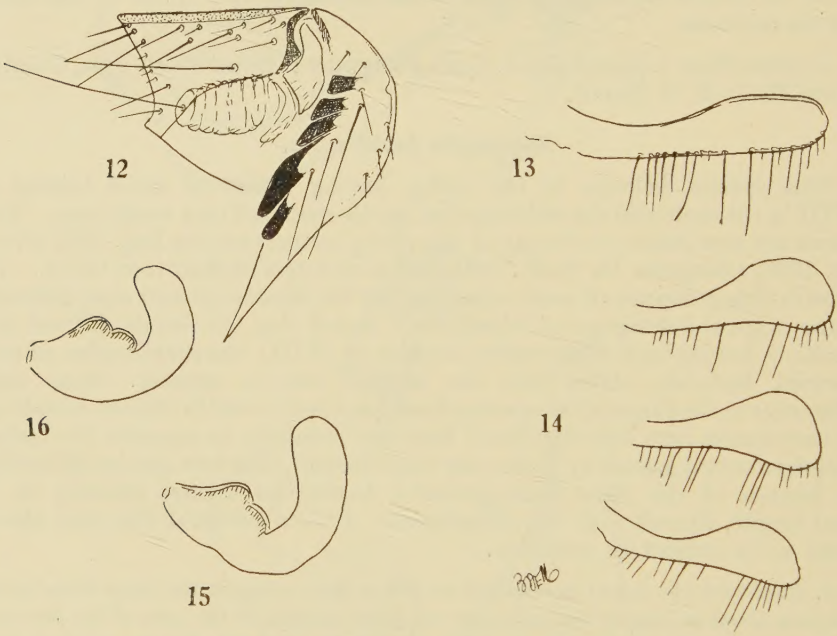
♀. Very like the females of the other three species but with no lateral bristles on the basal sternite; head of the spermatheca (fig. 11) somewhat globular and hence like that of *sulcata*; stIII–VI bear four bristles on each side and so differ from *sulcata*, which has only three on each side of these sternites.

The species is named in honour of Mr. D. H. S. Davis, the collector.

A series from the nests of *Gerbillus paeba*, Cape Province: Hopefield, 22.ix.39 (*D. H. S. Davis*). 3 ♂♂ from the burrows of *Taterona afra*, Cape Province: Hopefield (*D. H. S. Davis*).

Dinopsyllus zuluensis sp. n.

A large species, the male measuring 3·4 mm. in length. Frons very short (fig. 12), as short as in *kempi* J. & R. 1913; stVIII of the male as in *ellobius abaris* Jordan 1930. On the



Figs. 12–16.—12, *Dinopsyllus zuluensis* sp. n. ♂ head; 13, *Dinopsyllus zuluensis* sp. n. ♂, apex of stIX; 14, *Dinopsyllus ellobius abaris* J. apex of stIX of 3 ♂♂ from the type locality; 15, *Dinopsyllus zuluensis* sp. n. ♀ spermatheca; 16, *Dinopsyllus ellobius abaris* J. spermatheca of a ♀ from the type locality.

whole, the species is very closely related to *ellobius abaris*, for which it was at first mistaken. The most striking feature of this species is the great length of the bristles; for example, those of the anterior row of tergites overlap the bases of the next row. The male differs from other short-headed *Dinopsyllus* in the shape of the IXst (figs. 13, 14 & 17), which is hardly at all expanded apically and in the fact that the upper antepygidial bristle is less than half the length of the median one. In the female the spermatheca (figs. 15 & 16) is characteristic in having a comparatively long tail and a relatively narrow head; in this sex too the upper antepygidial bristle is less than half the length of the median one.

A series off a species of mole, Zululand: Eshowe, 13.ii.37.

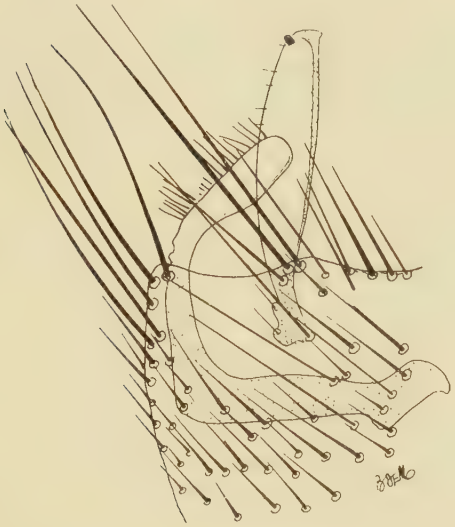


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Fig. 17.—*Dinopsyllus zuluensis* **sp. n.** ♂ terminalia.

Book Notice.

The Record of the Royal Society of London for the Promotion of Natural Knowledge. Fourth edition. 4to. London (Royal Society), 1940. pp. vii + 578, 19 pls. Price 21*s.*

The first edition of this work appeared in 1897 with the object of providing a compendium of information, largely historical, regarding the rise and progress, the organisation and work of the Royal Society. The last edition appeared on the occasion of the 250th anniversary of the foundation of the Society in 1912.

The first part of the book deals with the history of the Society and of its Charters and Statutes, the Funds administered by the Society and the principal benefactors, the Library, the Committees, and the Publications, and the Parliamentary Grants administered and a list of the bodies on which the Society is represented.

A series of Appendices give the text of the Charters, and the Statutes, and lists of the Patrons and Officers, Medallists and Lecturers, of Fellows (both chronological and alphabetical), and a Subject Index.

The illustrations comprise portraits, and pictures of some of the Meeting Rooms and some documents relating to the early history of the Society.

ON THE GENERA *HYDROBAENUS* FRIES AND *TRISSOCLADIUS* KIEFFER (DIPTERA, CHIRONOMIDAE)

By F. W. Edwards, F.R.S.

When revising the British Chironomidae in 1929 (*Trans. ent. Soc. Lond.* **77** : 279–430) I gave brief notes on those European genera of the family which were not known to occur in this country, including among others the Orthocladiine genera *Hydrobaenus* Fries and *Trissocladius* Kieffer, neither of which I had then been able to study in detail. The omission from consideration of *Hydrobaenus* was unfortunate, because this genus was the earliest described of the subfamily.

More recently my friend Prof. Aug. Thienemann of Plön has studied the early stages of the genotypes of both these genera (*H. lugubris* Fries and *Trissocladius brevipalpis* Kieffer) and has published (1935, *Stettin. ent. Ztg* **96** : 215) the surprising conclusion that they are so closely similar to *Dactylocladius distylus* Kieffer and *Orthocladius grandis* Kieffer (*glabripennis* Goetghebuer) that all four species must be included in one and the same genus —this notwithstanding the fact that Thienemann recognises numerous genera allied to *Orthocladius*. *O. grandis* (*glabripennis*) is a British species, and the adults which I have examined are so closely similar to those of typical species of the subgenus *Orthocladius* that I have been unable to discover any feature by which they might be distinguished from that subgenus, in fact they show a greater resemblance (notably in male genitalia) to *O. rivulorum* Kieffer (type of *Orthocladius*) than they do to *O. distylus* Kieffer. If Thienemann is correct in his conclusions, the consequence must be that the name *Orthocladius* will fall as a synonym of *Hydrobaenus*; and further, if the genus is to be understood in the wide sense in which I employed it in 1929, *Spaniotoma* Philippi will also become a synonym, and the various subgenera of *Spaniotoma* will have to be placed under *Hydrobaenus*.

Before admitting the correctness of Thienemann's conclusion, and accepting its serious nomenclatorial consequences, it was clearly desirable that the adults of the species in question should be re-examined. This I have now been able to do, and the purpose of this note is to add some details to the published descriptions, particularly of *Hydrobaenus*, which was very imperfectly described.

Hydrobaenus lugubris Fries.

1830. *Hydrobaenus lugubris* Fries, *K. Sv. Vet. Akad. Handl.* **1829** : 176.
1830. *Chironomus occultans* Meigen, *Syst. Beschr.* **6** : 254.
1831. *Psilocerus occultans* Ruthe, *Isis von Oken* **11** : 1207.
1831. *Hydrobaenus lugubris* Fries, *Isis von Oken* **11** : 1350–1357 (figs.).
1915. *Trissocladius praticola* Kieffer, *Broteria* **13** : 86.
1913. *Trissocladius griseipennis* Goetghebuer, *Ann. Biol. lacust.* **6** : 7 (sep.).
1921. *Trissocladius lugubris* (Fries) Goetghebuer, *Mem. Mus. Hist. nat. Belg.* **8** : 91.

I have examined the following material: (1) Meigen's type of *C. occultans* (a female sent him by Ruthe); (2) one male of *C. occultans* without abdomen, coll. Ruthe, and another without head, coll. Bouche, both lent from Berlin Museum in 1936; (3) a series of both sexes of *T. praticola* Kieffer, presented to the British Museum by Prof. Thienemann. All these evidently belong to the same species. The identity of *C. occultans* and *T. praticola* may therefore

be regarded as established, while from Fries' description of the characters and habits of *H. lugubris* there can be little, if any, doubt that this species is also the same, as has long been assumed. Goetghebuer's description of *T. griseipennis* agrees.

H. lugubris adult shows the following points of agreement with *O. glabripennis* and other species of *Orthocladius* s.str. (Group C) as defined by me in 1929 :—

Eyes bare, reniform, with the upper part rather small and narrow. Palpi normally 4-segmented (though the last two segments are often more or less fused, sometimes completely so). Mesonotum with distinct erect dorso-central hairs but without acrostichal hairs or with only a very few minute ones posteriorly; no oval membranous area behind middle (such as occurs in *Abiskomyia*). Scutellum with about the basal half strongly sclerotised, remainder less so. Hind tibia with comb on inner side at tip; one spur minute, the other longer and setulose basally. Fourth hind tarsal segment cylindrical. Claws simple; empodium very short; no pulvilli. Wing-membrane appearing finely punctate under a magnification of 250, without distinguishable microtrichia, and without macrotrichia. Squama fringed. Costa reaching very slightly beyond tip of $R4 + 5$; $R2 + 3$ ending about midway between other branches of radius; $R4 + 5$ ending slightly beyond level of tip of $Cu1$; *An* reaching far beyond *fCu*, which is only slightly beyond *r-m*; *r-m* not very oblique; $Cu2$ straight.

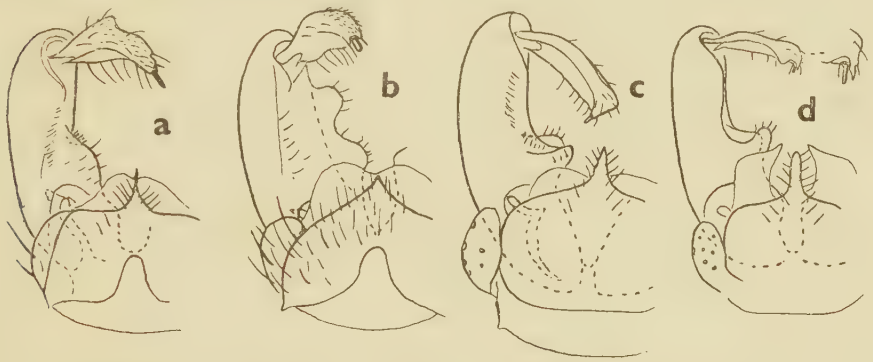

Fig. 1.—Hypopygia of Orthocladiinae; a, *Trissocladius brevipalpis* Kieffer; b, *Hydrobaenus lugubris* Fries; c, *Orthocladius glabripennis* Goet.; d, *O. rivulorum* Kieffer.

On the other hand I find that *H. lugubris* differs from *O. glabripennis* (and other species of my *Orthocladius* s.str.) in the following points :—

Antenna of ♂ short, without plume and with only 11–13 segments (the number inconstant, perhaps sometimes the full 14). Palpi very short, the first two segments each but little longer than broad. Pronotum larger. Mesonotum with the median poorly sclerotised line broader than usual. Hypopygium of ♂ with the ninth tergite hairy all over, anal point not well differentiated. Legs somewhat stouter; fourth tarsal segment shorter than fifth, but not very much so; spur of front tibia very short and curved. Wings dark, with anal lobe obtuse.

The most striking of these differences is in the male antenna, but this cannot be considered fundamental, as a similar reduction occurs in various other species of the *Orthocladius* group (e.g. *Smittia brevipennis*). Some of the other slight peculiarities might well be associated with mating on the ground

or on the surface of water instead of in the air as is usual in this group. There certainly does not appear to be any character on which *Hydrobaenus* could be separated generically from *Orthocladius*, though the sum of the points noted above (especially the short palpi and somewhat enlarged pronotum) might be considered sufficient to warrant treating the two as distinct subgenera, which for practical reasons would be preferable to sinking *Orthocladius* as an absolute synonym of *Hydrobaenus*.

Trissocladius brevipalpis Kieffer.

1908. *Trissocladius brevipalpis* Kieffer, *Z. wiss. InsBiol.* **4** : 4.
1921. *Trissocladius nigerrimus* Goetghebuer, *Mem. Mus. Hist. nat. Belg.* **8** : 91.

I have examined a male (paratype?) of *T. nigerrimus* presented by Dr. Goetghebuer; the synonymy of *nigerrimus* with *brevipalpis* is accepted by him and Thienemann, and there is no reason to doubt it.

T. brevipalpis resembles *H. lugubris* and *O. glabripennis* in all the points mentioned above; it further agrees with *H. lugubris* in the short palpi (which may have either three or four segments according to whether the last two segments are fused or not), and in the dark wings. On the other hand, it has normal plumed and 14-segmented antennae, pronotum of normal size, median line of mesonotum narrow, ninth tergite with few hairs, legs slender, spur of front tibia straight though short, fourth tarsal segment as long as fifth, empodium more than half as long as claws, wings with the anal lobe much better developed and with *r-m* longer and more oblique.

From the above it would seem that *T. brevipalpis* occupies an intermediate position between *H. lugubris* and typical *Orthocladius*, with perhaps more resemblance to the latter. Apart from the reduced antennae of *H. lugubris*, the most obvious features on which a subgeneric separation of both this species and *T. brevipalpis* could be made are the short palpi and dark wings. Such a definition, however, would exclude *O. glabripennis* which agrees with the genotype of *Orthocladius* in having long palpi (always distinctly 4-segmented) and white wings, as well as in practically all other respects. I cannot discover any adult character which would associate these three species together and at the same time separate them from other *Orthocladius*, so that at present it seems impossible to harmonise the evidence from adults and early stages as to their affinities. On adult characters *Orthocladius* could be recognised as a subgenus of *Hydrobaenus*, but must include both *glabripennis* and *rivulorum*; *Trissocladius* could either be admitted as another subgenus or included in *Hydrobaenus* or *Orthocladius*. But in any case all these four species are evidently much more closely related to one another than any of them are to other groups such as *Trichocladius*, *Limnophyes* or *Smittia*, which I have included with *Orthocladius* as subgenera of *Spaniotoma*.

I give herewith a figure of the male hypopygium of *H. lugubris*, which has not been figured or described in detail before, and for comparison corresponding figures of *T. brevipalpis*, *O. glabripennis* and *O. rivulorum*. It will be noted that the first two appear quite distinct from one another and from the last two, but it is doubtful if the differences can be regarded as of more than specific importance. On the other hand, there is very little difference between *glabripennis* and *rivulorum* except in the structure of the tip of the style, and considering that there are no apparent differences between these two species in other parts of the body it seems incredible that they should be regarded as belonging to different genera or subgenera while the other two species, which show much greater differences, are classed with *glabripennis*.

ON THE IDENTITY OF *APANTELES CARBONARIUS* WESMAEL, WITH THE DESCRIPTION OF A NEW, CLOSELY RELATED, PALAEARCTIC SPECIES (HYM. BRAC.)

By D. S. Wilkinson, F.R.E.S.

(*Imperial Institute of Entomology.*)

Apanteles carbonarius Wesm.

Microgaster carbonarius Wesmael, 1837, *Nouv. Mém. Acad. Brux.* **10** : 47.
Apanteles ?, Lyle, 1916, *Entomologist* **49** : 122—footnote. *Apanteles anomalus* Lyle, 1925, *Ent. mon. Mag.* **61** : 119–120. *Partim.* **Syn. n.**
Apanteles gracilis Curtis, Marshall, 1885, *Trans. ent. Soc. London* **1885** : 185–186; 1888, *Spécies Hymén. d'Eur.* **4** : 435.

♀. Black; the front trochanters and trochantines, front femora (save at extreme base, and in basal half above, where they are darkened), front and middle tibiae, front and middle tarsi (save for darkening towards apex, and for black feet), middle femora in at least apical half or two-thirds (save for darkening above and below), middle and hind trochanters and trochantines to some extent, and hind tibiae in quite the basal three-fourths, red testaceous; hind femora with some red testaceous marking medially on the faces, otherwise strongly darkened; legs otherwise darkened, and the coxae black; palpi and tibial spurs pale; lateral membranous margins of 1st tergite only weakly pigmented; wings faintly infumated evenly throughout, and the setae coloured (save perhaps of hind-wing basally); costal veins in greater part more or less red testaceous; costal veins at apex, stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins only weakly pigmented; stigma only just opaque, but uniformly so.

♂. Black; front femora in about apical third, front tibiae, middle tibiae more or less in about basal two-thirds, and hind tibiae in basal fourth, red testaceous; middle femora often with some indication of red testaceous marking at apex; hind tibiae variable, so that sometimes the whole basal half is red testaceous, sometimes wholly darkened; all coxae, trochanters, trochantines, middle and hind femora, black, legs otherwise darkened; otherwise as description for ♀.

♀♂. *Head*: clypeus and face throughout with closely placed, minute punctation (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frontal orbits, frons, and vertex, minutely punctate (degree 1) and more sparsely so than on face; posterior ocelli much nearer to each other than to the eyes; flagellum of ♀ longer than combined length of head, thorax, and abdomen, equal to or just longer than length of head together with twice the length of the thorax, of ♂ longer than combined length of thorax and abdomen together with three times the length of the head, about equal to three times the length of the thorax. *Thorax*: mesonotum closely punctate (degree 3), the punctures coarsely inserted so that in certain lights the mesonotum is almost describable as minutely rugose, and when viewed from in front coarsely pruinose; disc of scutellum closely punctate (degree 3); propodeon with a very strong median longitudinal carina throughout its length, otherwise across base entirely smooth and highly shining, and the apical two-thirds or four-fifths with weak crenulation and irregular carinulae to a varying extent. *Wings*: metacarp longer than stigma. *Legs*: hind coxae basally above with a few punctures (degree 3) and apically above to some extent minutely punctate (degree 1), on outer faces smooth and highly shining save for some minute punctation towards apex; hind tibial spurs equal, between one-third and two-fifths the length of the basal segment of the hind tarsus. *Abdomen* (figs. 1, 2):

1st tergite in about basal two-fifths strongly excavate and with a strong, smooth, median longitudinal sulcus, on each side of which the tergite is aciculated, the tergite apically turned over and rugose throughout save for the smooth median apical lunule, the broadest part of the tergite always shortly before the rounded apical angles; 2nd tergite rugose, more usually with indication of a middle-field; 2nd suture strong; 3rd tergite finely rugose; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture; ovipositor sheaths much shorter than the basal segment, and just longer than the 2nd segment, the ovipositor longer than the basal segment, much shorter than combined length of basal and 2nd segment, of the hind tarsus; hypopygium of ♀ at apex just slightly acute.

Length, 1·75–2·0 mm.

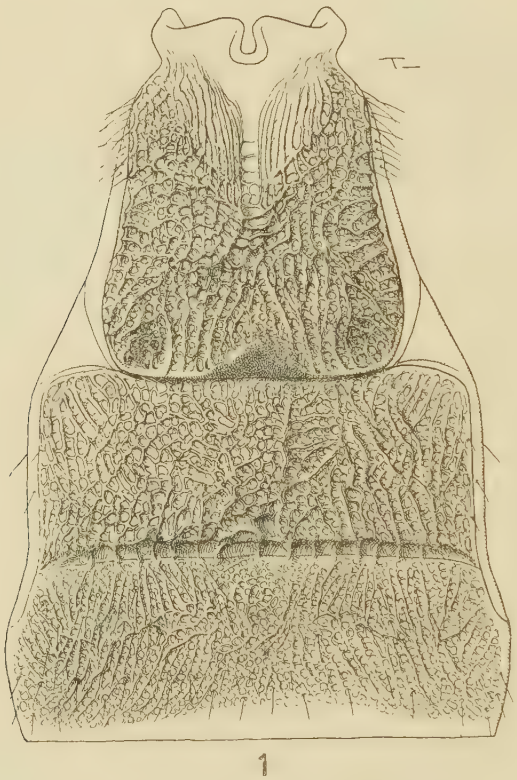

Fig. 1.—*Apanteles carbonarius* Wesm., basal tergites, ♀. ×160.

Redescribed from the following material:—British Museum: Marshall Collection, 2 ♀♀, "L", in coll. Marshall as *gracilis* Curt.; Lyle Collection, New Forest, 1 ♀, 11.vi.1911, ser. no. 1296 (*G. T. Lyle*), *type* of *anomalus* Lyle. Norwich Castle Museum: Bridgman Collection, Shoreham, 11 ♀♂, vi.1887, ser. no. 855 (*W. H. B. Fletcher*). Essex Field Club: Fitch Collection, 2 ♀♀, 1 ♂, "L". Oxford University Museum: Yarnton, 2 ♀♀, 3 ♂♂, host larva coll. 14.iv.1923, par. em. 13, 19, 20, 26.v.1923 (*E. G. R. Waters*). D. S. Wilkinson's Collection: England, Kent, Bexley, 1 ♂, em. 31.v.1937, 23 ♀♀, 22 ♂♂, coll. 15.vii.1937, em. 23.viii.1937, Dartford Heath, 11 ♀♀, 4 ♂♂, coll. 15.vii.1937, em. 21.viii.1937 (*R. L. E. Ford*).

Further material examined:—Musée Royal d'Histoire Naturelle, Bruxelles: Wesmael Collection, 2 ♀♀ (one the *type* of *carbonarius* Wesm.). Bundesanstalt für Pflanzenschutz, Wien: Leützmannsdorf, Nö., 1 ♂, 27.v.1935.

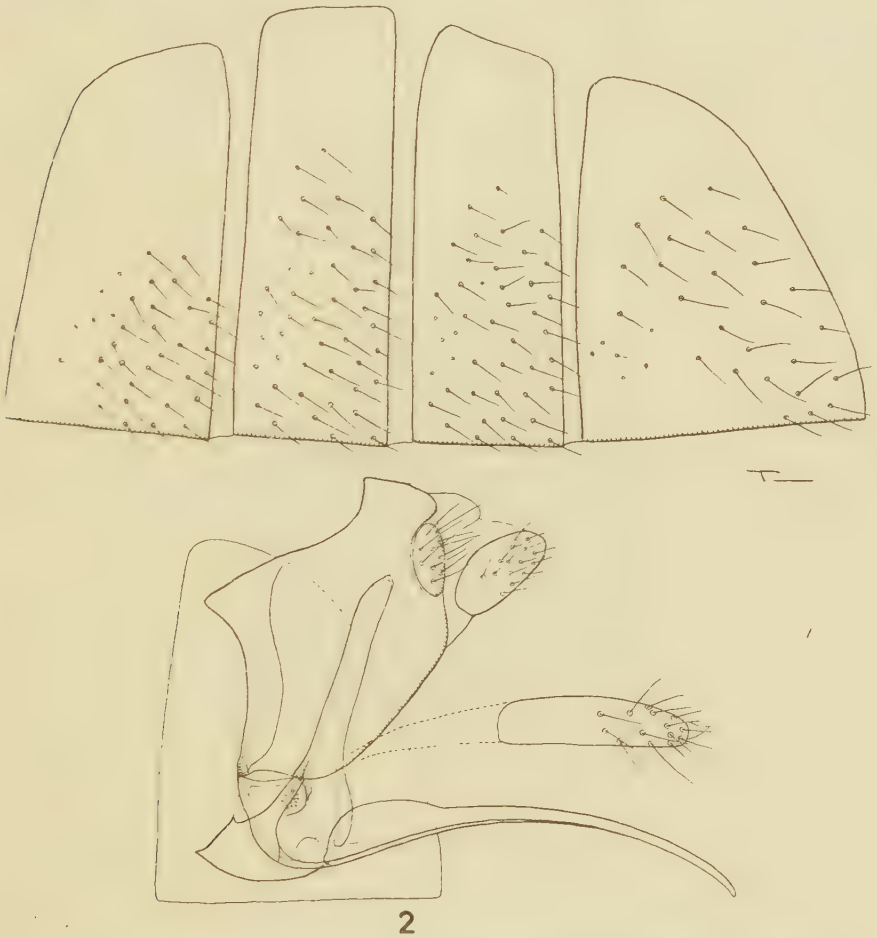

Fig. 2.—*Apanteles carbonarius* Wesm., apical ventrites and, below, genitalia, side view, ♀. ×160.

Type of *carbonarius* Wesm. in the Wesmael Collection, Musée Royal d'Histoire Naturelle, Bruxelles, mus. reg. no. 1997; *type* of *anomalus* Lyle in the Lyle Collection, British Museum.

Host. The original description of *carbonarius* is without host record. Lyle originally described part of his material of *anomalus*, namely the pair from Yarnton, to have been bred from the Tineid *Bucculatrix nigricomella* Zell., on *Chrysanthemum leucanthemum*, and the remainder of his material without host record.

Of the material from which I have redescribed this species, the series in the Bridgman Collection is recorded from *Bucculatrix aurimaculella* Stn., which is now known as *B. nigricomella* Zell.; and all of the series from Yarnton, and

Ford's two series from Bexley, were also bred, as solitary parasites, from this host. Ford's series from Dartford Heath was bred as a solitary parasite from *B. cristatella* Zell. The remainder of the material before me is without host record.

There are a few host records in literature. Rondani (1872) gives the Geometrid *Acydalia brumaria* Esp., a species now known as *Operophtera brumata* L., and Taschenberg (1880), Leonardi (1927), and Fahringer (1935), also refer to this name. Vollenhoven (1873), as noted by Marshall (1888), records as a host the Lasiocampid *Macrothylacia rubi* L., a record that has been referred to by Dalla Torre (1898), Gaulle (1907), Leonardi (1927), and Fahringer (1935); while Rudow (1917) has recorded the Nymphalid *Vanessa*, now *Nymphalis, antiopa* L., and Leonardi (1927) the Nymphalid *Pyrameis*, now *Vanessa, cardui* L. I am prepared to accept none of these records, however. Finally, Mitterberger-Steye (1922) has recorded the Tineid *Lithocolletis alpina* Frey, but queries the determination of the *Apanteles*.

Cocoons. A. carbonarius pupates inside the elongate, ribbed puparium of its host; and emergence takes place through a jagged, more or less circular hole.

Commentary. Wesmael originally described his *carbonarius* from two females taken by himself in the outskirts of Brussels. In the Wesmael Collection standing under this name were two females. These agree perfectly with Wesmael's description, and are obviously the original two specimens; and I am selecting one as the type, and so labelling it. They agree perfectly and in the minutest detail with all the material from which I have made the redescription of the species, with some of which material I myself compared them.

Lyle originally described his *anomalus* from two females and three males, namely one female taken by himself on a window of his house at Brockenhurst, New Forest, one male taken by himself on the Gog Magog Hills, Cambridge, on 12th Aug. 1917, one male taken by himself at the Fleam Dyke, on 19th Aug. 1917, and a pair bred by E. G. Waters from *Bucculatrix nigricomella* at Yarnton and lent to him by A. H. Hamm. In the Lyle Collection standing under this name and agreeing perfectly with the original description were three specimens. These, from their labelling, are quite obviously the first three specimens Lyle referred to in his description; and the card of the female from the New Forest has attached to it a small red label marked " T ", and the two others a small blue label. In addition, in the Oxford University Museum were two females and three males labelled to have been bred by Waters at Yarnton from *nigricomella*. Of these latter, the card of one male has attached to it a small red label marked " T ", and the card of one female a small blue label, in exactly the same manner as the first three specimens I have discussed; and these two are quite obviously the pair stated by Lyle as having been lent to him. Of these five original specimens of Lyle's, three, namely the female from the New Forest, which he himself labelled, and referred to in his register, as the type, and which is obviously to be accepted as the type, of his *anomalus*, and the pair from Yarnton, are conspecific and agree perfectly and in the minutest detail with all the other material from which I have redescribed the species. The two remaining males (?) are not referable here, but to *A. comes* Wilkn.

The two females from Marshall's Collection, and the three specimens from Fitch's, all quite obviously belong to the same series. In addition, they are quite clearly *carbonarius* Wesm.; and, since in both collections they were the only specimens standing under the name *gracilis* Curtis, and since they all bear the " L " (Marshall's abbreviation for Leicestershire), they are quite obviously

also the material referred to by Marshall under *gracilis* in 1885 and 1888, despite the fact they do not entirely agree with his description.

Thomson (1895, *Op. Ent.* : 2258) apparently believed *carbonarius* Wesm. and *solitarius* Ratz. to be the same species. The types of both are known to me, however, and there is no question but that they are distinct.

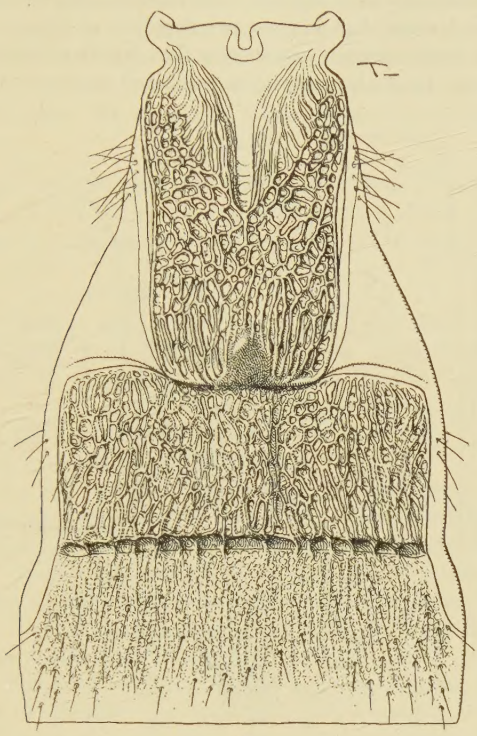

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FIG. 3.—*Apanteles comes* sp. n., basal tergites, ♀. ×160.

Apanteles comes sp. n.

Apanteles anomalus Lyle, 1925, *Ent. mon. Mag.*, **61** : 119–120 (*partim*). **Syn. n.**

♀. Black; front femora (save at extreme base, and in basal half above, where they are darkened), front and middle tibiae, front tarsi (save for the black feet) and middle tarsi (save for darkened apical segment and black feet), middle femora towards apex more or less, hind tibiae in about basal two-thirds, and occasionally the hind trochantines, red testaceous; legs otherwise darkened, and the coxae, trochanters, trochantines otherwise, middle femora otherwise, and hind femora, black; palpi and tibial spurs pale; lateral membranous margins of 1st tergite only weakly pigmented; wings hyaline or faintly infumated evenly throughout, and the setae of the fore-wing coloured, of hind-wing apparently colourless; costal veins in greater part more or less red testaceous; costal veins at apex, stigma, metacarp, 1st abscissa of radial, transverse cubital, and 2nd abscissa of cubital, light brown, the remaining veins only weakly pigmented; stigma uniformly opaque.

♂. Black; front femora throughout apical third and in apical half on sides, front tibiae to some extent, middle and hind tibiae in basal fourth or third, red testaceous; middle

femora sometimes with some indication of red testaceous marking at apex; tibiae and tarsi otherwise darkened, and the feet and the legs otherwise black; otherwise as description for ♀.

♀♂. *Head*: clypeus and face throughout with closely placed, minute punctation (degree 2); facial depressions nearer to apex of clypeus than to the eyes; frontal orbits, frons, and vertex, minutely punctate (degree 1) and more sparsely so than on face; posterior ocelli much nearer to each other than to the eyes; flagellum of ♀ just longer than combined length of head, thorax, and abdomen, just shorter than length of head together with twice the length of the thorax, of ♂ about equal to combined length of thorax and abdomen

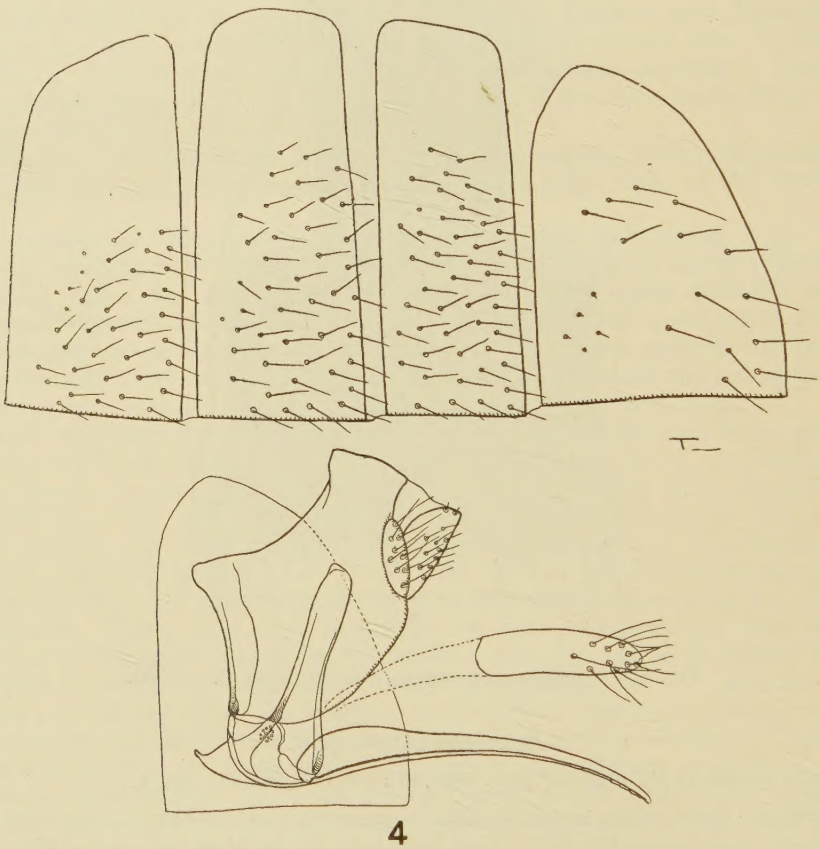

Fig. 4.—*Apanteles comes* sp. n., apical ventrites and, below, genitalia, side view, ♀. ×160.

together with three times the length of the head, shorter than three times the length of the thorax. *Thorax*: mesonotum closely punctate (degree 2), pruinose in many lights and when viewed from in front; disc of scutellum closely punctate (degree 2 and 3); propodeon with a strong median longitudinal carina throughout its length, otherwise more or less entirely smooth and highly shining. *Wings*: metacarp shorter than stigma. *Legs*: hind coxae basally above with a few punctures (degree 3) and apically above to some extent minutely punctate (degree 1), on outer faces smooth and highly shining save for some minute punctation towards apex; hind tibial spurs equal, between one-third and two-fifths the length of the basal segment of the hind tarsus. *Abdomen* (figs. 3, 4): 1st tergite in about basal

two-fifths strongly excavate and with a strong, smooth, median longitudinal sulcus, on each side of which the tergite is aciculated, the tergite apically turned over and finely rugose throughout save for the median apical lunule, the broadest part of the tergite always immediately following the constriction of the base; 2nd tergite very finely rugose, or only aciculate, more usually with indication of a middle-field; 2nd suture well marked; 3rd tergite smooth or with some aciculation, and minutely punctate; succeeding tergites minutely punctate; ventrites of ♀ without median longitudinal suture; ovipositor sheaths much shorter than the basal segment, just longer than the 2nd segment, the ovipositor longer than the basal segment, much shorter than combined length of basal and 2nd segment, of the hind tarsus; hypopygium of ♀ at apex just slightly acute.

Length, 1·5–1·8 mm.

Described from the following material :—British Museum : Lyle Collection, Gog Magogs, 1 ?, 12.viii.1917, ser. no. 3354, Fleam Dyke, 1 ?, 19.viii.1917, ser. no. 3359 (*G. T. Lyle*), cotypes of *anomalus* Lyle. Universitetets Zoologiske Museum, Copenhagen : 1 ♀, 1 ♂, coll. 13.v.1920, em. 28, 31.v.1920 (*Gudmann*). O. W. Richards's Collection : Slough, Bucks, 2 ♀♀, 2 ♂♂, ser. nos. 10236 7/7, 10239, 10240 7/7, 10347, em. 2.viii.1938, 1 ♀, 2 ♂♂, 10234, 10241 7/7, 11008, 31.viii., em. 2.ix.1938, 1 ♀, 10236, 28.vi., em. 2.viii.1938, 1 ♂, 10238 8/7, 28.vi.–8.vii.1938 (*O. W. Richards*). D. S. Wilkinson's Collection : England, Kent, Bexley, 1 ♀, 4 ♂♂, em. 31.v.1937, Dartford Heath, 4 ♀♀ (one the *type*), 11 ♂♂, coll. 15.vii.1937, em. 21.viii.1937 (*R. L. E. Ford*).

Type deposited in the British Museum.

Host. With the exception of the two Lyle specimens, which are without host record, all the material from which I have described this species was bred from the Tineid *Bucculatrix cristatella* Zell. on *Achillea millefolium*.

Cocoons. *A. comes* pupates inside the elongate, ribbed puparium of its host; and emergence takes place through a jagged, more or less circular hole.

Commentary. Two of the specimens from which I have described this species, namely Lyle's two males (?) from the Gog Magog Hills and the Fleam Dyke, Cambridge, were described by Lyle in 1925 as a new species, with other material, under the name *A. anomalus*, the type of which I have shown to be comparable with, and which I have synonymised under, *A. carbonarius* Wesm.

These two species, namely *A. carbonarius* Wesm. and *A. comes* sp. n., I must, I suppose, refer to my Group F, although, from the position in which their ovipositor sheaths tend to lie and also because their hosts are Micro- and not Macrolepidopterous, I should have much liked to have placed them in Group U; and I am still inclined to believe they could equally well be so placed.

These two species cannot be made to run easily in Group F, nor, despite being so closely related, can they be made to run together in this section. I do not feel I should be justified at this stage of my work in entirely rearranging this section of the key merely for their reception, and consequently, for the moment, I do not propose to include them in the key; but this does not concern me very greatly since both species are remarkably distinctive on account of the form of their three basal tergites, which I have figured. I think I should remark, finally, that, apart from the shape of the 1st tergite, the only other outstanding character that separates these two species, but happily one that can be concisely stated, is the length of the metacarp relative to the stigma.

Book Notice.

A Laboratory guide to the study of the evolution of the wings of Insects. By J. C. Bradley. 2nd edition enlarged and rewritten. 8vo. Ithaca, N.Y. (Daw Illston & Co.), 1939. pp. 60, 70 pls., +70 pls., 25 figs.

This is the second edition of a Laboratory handbook first issued in 1931. It comprises a small pamphlet with the text and 70 outline plates of drawings of wings, and a series of lightly printed outlines of the same drawings in a folder.

The book is prepared for the use of the student, and for this purpose the lightly printed outlines are supplied with the suggestion that the several veins be coloured in different inks to assist the student in his studies.

The text is explanatory of the differences in the progressive series of illustrations and also gives the notation of the veins. The Comstock–Needham system of uniform terminology, with certain modifications, is used.

Book Notice.

A General Zoology of the Invertebrates. By G. S. Carter. 8vo. London (Sidgwick & Jackson), 1940. pp. xxviii + 509, 13 pls., 172 figs. Price 25*s*.

This volume is one of the series " Text-books of animal biology " edited by J. S. Huxley and is intended to meet the needs of a student in his first or second year at the university. It is not a textbook of morphological zoology but rather of the general zoological problems faced by a student, and selected from the standpoint of animal biology and ecology.

The book is arranged in four sections: I. Protoplasm and the free-living cell; II. The multicellular body; III. Comparative physiology; IV. Some general problems of invertebrate zoology. No consideration is given to heredity.